

WHAT IS CLAIMED IS:

1. A homogenous cation exchange membrane prepared using a method comprising:

brominating a polyvinyl alcohol;

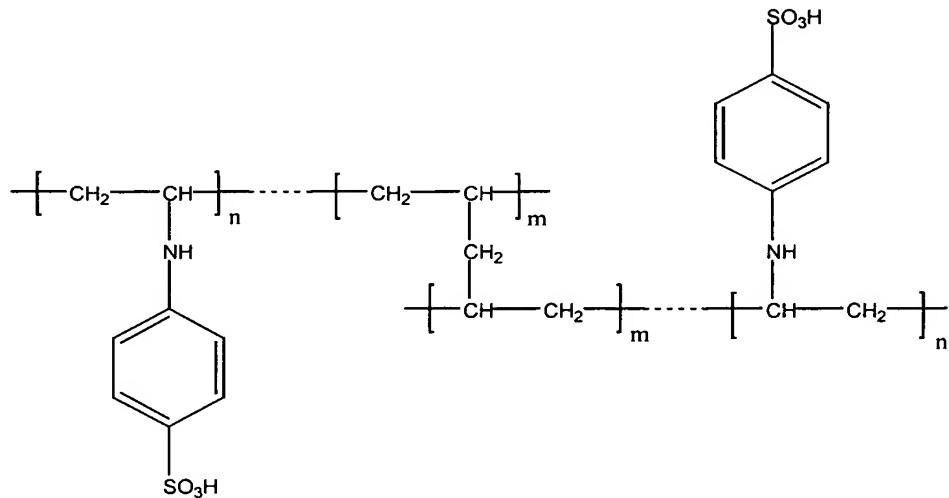
5 treating the polyvinyl alcohol with an acid to induce sulfonic acid groups;

forming a membrane; and

crosslinking the membrane using a formaldehyde solution to create a homogenous cation exchange membrane.

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2. The membrane of Claim 1, wherein the membrane comprises a compound having the following formula:



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3. The membrane of Claim 1, further comprising brominating the polyvinyl alcohol in a mixture including 0.5N bromine in acetic acid.

brominating

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4. The membrane of Claim 1, wherein the acid comprises sulfanylic acid.

5. The process of Claim 4 wherein the sulfanylic acid further comprises a 25% solution of sulfanylic acid.

6. The process of Claim 1, wherein crosslinking 5 further comprises treating the membrane with formaldehyde in concentrated sulfuric acid.

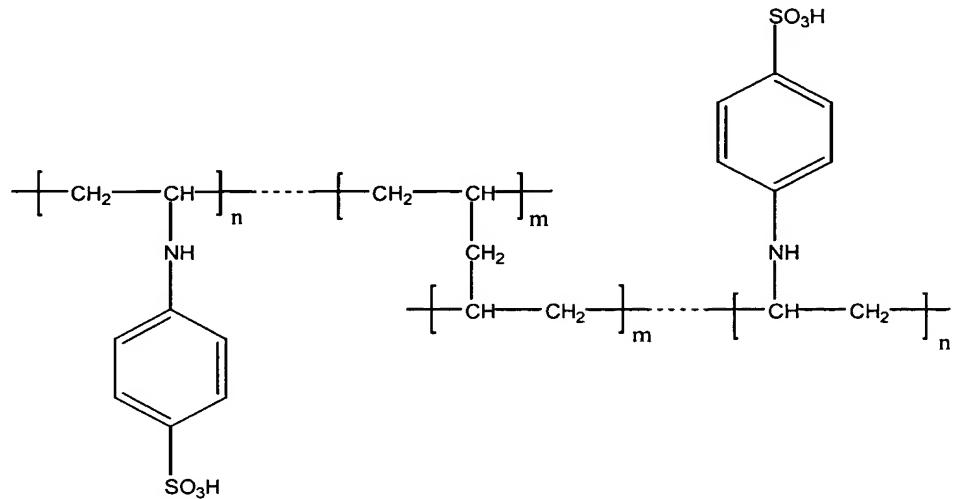
7. The membrane of Claim 1, wherein the membrane has an ion exchange capacity of 2 to 2.5 meq of sodium/g.

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8. The membrane of Claim 1, wherein the membrane swells between about 25 to 30% in water.

9. The membrane of Claim 1, wherein the membrane 15 has a resistance of approximately 3 to 4 ohm cm².

10. A cation exchange membrane comprising a compound having a formula of:



wherein the membrane is homogenous.

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11. The membrane of Claim 10, wherein the membrane has an ion exchange capacity of 2 to 2.5 meq of sodium/g.

12. The membrane of Claim 10, wherein the membrane
10 swells between about 25 to 30% in water.

13. The membrane of Claim 10, wherein the membrane has a resistance of approximately 3 to 4 ohm cm^2 .

14. A process for electrodialysis comprising:
passing a solution comprising ions to be removed
through a membrane stack having at least one cation
exchange membrane prepared using a method including:
5 brominating a polyvinyl alcohol;
 treating the polyvinyl alcohol with an acid to
 induce sulfonic acid groups;
 forming a membrane; and
 crosslinking the membrane using a formaldehyde
10 solution to form a homogenous cation exchange membrane;
 applying a current orthogonal to membrane surfaces
 while passing the solution through the membrane stack;
 and
 15 withdrawing purified or concentrated solution from
 alternating compartments of the membrane stack.

15. The process of Claim 14 wherein the solution
comprises an aqueous industrial effluent.

20 16. The process of Claim 14 wherein the solution
 comprises a naturally occurring aqueous solution.

25 17. The process of Claim 14, wherein the solution
 comprises brackish water or seawater.

18. The process of Claim 14, wherein the brackish
water or seawater is not treated to remove excess ions
prior to electrodialysis.

30 19. The process of Claim 14, wherein the cation
 exchange membrane is homogenous.

20. The process of Claim 14, wherein the cation exchange membrane further comprises a compound having the following formula:

